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ENGINEERS and CONTRACTORS RECOMMEND

ACME FLUES

Engineers and Contractors are good people to cultivate in prospecting for gas appliance sales. Unfortunately, the big concerns who are in a position to recommend appliances for using gas, are not given the attention that would undoubtedly result in more profitable business.

As an instance of the prospective sales obtainable from this source we quote below a letter received from McQuillen & Chave, Inc., Engineers and Contractors, 198 Eleventh Ave., New York:

"Replying to your letter of the 14th inst., we have installed the Acme Flue and are pleased with the result.
"We believe that it accomplishes what you claim for it and will be glad to recommend it to our customers.

"Very truly yours,

"McQUILLEN & CHAVE, Inc.

"(Signed) W. E. Chave, Pres."

The Acme Flue attached to the oven vent of the range destroys all of the staining, greasy, smelling fumes, that now flow into the kitchen, discoloring the walls and causing a lot of hard, disagreeable labor to clean, and, finally, expense in painting.

When responsible concerns in every industry or profession having to do with the sale or installation of gas burning appliances, freely and conscientiously endorse and recommend Acme Flues on the strength of satisfaction, utility and economy, what stronger talking point do you need to garner the profit from the sale of Acme Flues?

There's 70% Net Profit waiting for every gas company—Get yours

Write at once to

COMMERCIAL GAS APPLIANCE CO.

213-215 GUILFORD AVE., BALTIMORE, MD.

Dependability in a gas meter means a constant measure of reliable service; this is appreciated by the Superintendent, the Meter-reader and the Consumer.

Cleveland Gas Meters have a reputation for dependable service, the result of over thirty years' experience in manufacturing.

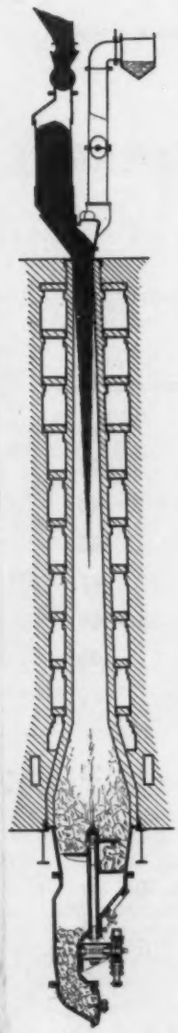
Our thoroughly organized and completely equipped factory assure you that the workmanship, materials, accuracy and general efficiency are unequaled.

"A" and "B" Types Meter Repairing

CLEVELAND GAS METER COMPANY

2180 East 65th Street **Cleveland, Ohio**

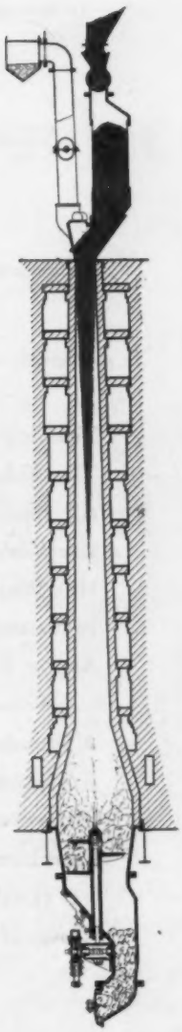
GLOVER-WEST
Vertical Retorts



American Installations

Fitchburg, Mass.
Springfield, Mass.
Pawtucket, R. I.
Portland, Me.
Ottawa, Ont.
Montreal, Que.
Fitchburg, Mass. (Repeat)
Pernambuco, Brazil
Santos, Brazil
Montreal, Que. (Repeat)
Vancouver, B. C.
Victoria, B. C.
Montreal, Que. (2nd Repeat)
Watertown, N. Y.
Malden, Mass.
Vancouver, B. C. (Repeat)
Toronto, Ont.
Portland, Me. (Repeat)
Buenos Aires
Santiago, Chile
Fargo, N. Dakota

Combined Daily Capacity
36,000,000 Cu. Ft.



WEST GAS IMPROVEMENT CO.
of America, Inc.
441 Lexington Ave. New York.

American Gas Journal

SIXTY-SIXTH YEAR

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"MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS"

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AMERICAN
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Training Industrial Gas Engineers

Importance of trained men in meeting industrial fuel competition

J. P. Leinroth

Public Service Electric & Gas Company

THE present era is sometimes referred to as the scientific age. In all fields of endeavor we are trying to get down to a more scientific basis through scientific methods of attack. In the shop, in financial circles, in the business world, as well as in the professional fields, this new attitude is making itself apparent.

On the material side this new method of attack has already wrought such changes which in some cases have been well nigh revolutionary. But as great are the accomplishments and promise on the material side, it would seem that the potential possibilities that lie before us through increasing personal efficiency are almost beyond our comprehension. Harrington Emerson, the noted efficiency expert, after years of experience in this work, tells us that the average individual is only 20 per cent efficient, that he is only doing one-fifth the work of which he is capable. The efficiency with which the employees in our most successful industrial and business concerns work as compared to the efficiency of the ordinary employee is well marked. Indeed, it is this higher efficiency brought about by systematic selection, training and education which usually makes for the success of the former.

J. P. Leinroth

Movement Gaining Momentum

This movement to increase personnel efficiency, already well under way, will no doubt gain momentum, and authorities prophesize that it will be the outstanding economic achievement of the immediate future. It is today being reflected in the careful selection of men best suited for the work at hand and in the proper training and educating of these men for their particular jobs. Great amounts of time, energy and money are being spent in furthering this work. The specialist is a natural sequence, the "all-around" man is rapidly disappearing.

Progressive gas companies recognize the great results that may accrue from the proper selection, training and educating of their employees and these companies are going into this work on an increasingly extensive scale. Never have the opportunities for the ambitious gas company employee to educate and advance himself been so numerous as they are today.

Training Industrial Engineers Has Received Little Attention

It seems rather singular, therefore, that the selection, training and educating of industrial gas engineers has received so little attention. Perhaps this is due to the fact that only recently have the possibilities of developing the industrial gas load begun to be recognized. Today the most progressive men in the industry, when speaking of its future, put a great deal of stress on the development of the industrial load. Some have gone so far as to say that the future of the gas business lies largely in developing

this load. All agree that its development is of tremendous importance not only because of the great possibilities of gas sales, but also because of the fact that it is the most desirable and profitable kind of business to take on.

In view of these expressions from the leaders of the gas industry, it would seem that it naturally follows that the ways and means of getting this business on our lines should be developed intensively. From the standpoint of the gas company this largely resolves itself into the problem of the development of an efficient selling organization. It must be treated as a selling proposition—selling the services of the gas company to industry—for industry is not generally sold on gas as the "ultimate fuel." Naturally, in this organization wheel, the industrial gas engineer is the principal cog. If, therefore, we are vitally interested in getting the industrial business on our lines it is obvious that the upbuilding of an efficient industrial fuel department is of great importance to the gas companies considered both individually and as a whole.

Gas Not a Monopoly in Industrial Field

We cease to be a monopoly when considered in the light of getting the industrial heating load and we are confronted with the keen competition of other fuels on all sides. As a matter of fact, our share of the industrial heating business is very small when compared to the large amounts of competitive fuels used in industry. Nevertheless, we have every reason to feel encouraged by the progress that we have made and our opportunities will multiply as we go on.

It has been brought out recently by many authorities, including the president of the American Gas Association, that the supply of oil is rapidly being depleted and that its future supply is a matter of much concern. This is reflected in the recent action of President Coolidge in creating a Federal Oil Conservation Board. There does not seem to be much doubt but that within the next few years the oil scarcity will be acute and that many of the industries using oil for fuel will have to turn to another fuel. The whole question of conserving our fuel resources is receiving more attention today than ever before.

We are being warned almost daily of the folly of burning solid fuels directly without the preliminary recovery of by-products and the effects of this burning of raw fuels on the health of the community, and the advantages of the "smokeless town" is sure to be brought before us in a stronger light. Obviously a great part of this is industrial gas business and here lies a tremendous opportunity to add the most desirable kind of business to the gas companies' lines. Will they or will they not take advantage of it? The answer to this question will be largely dependent on how they will have prepared themselves—how well they have selected, trained and educated men as industrial gas engineers who will be wide-awake to the opportunity and be competent to take advantage of it. Our competitors have not been slow to recognize that the industrial heating load holds forth wonderful possibilities for them and they are today making an intensive campaign to interest the manufacturer in their fuel. There is no doubt that competition will be keener. Is it not time that the gas industry gave considerable thought to organizing for more active soliciting of this business?

Industrial Gas Advancing Rapidly

Industrial gas has made great strides in recent years, but these advances have been largely along the lines of developing more efficient appliances and in the proper application of gas to new fields—in a word, advances in what may be called the utilization end of the business. But what about the men who are to go out and cultivate this fertile field? Have we given them the consideration they deserve? How are we going to train these men for this work which is to have so great a bearing on the future of the gas industry? I believe almost all of us will agree that this phase has not received the attention that it should have received.

If we look about us at some of the more progressive industrial companies having use for sales engineers to market their product we will find that the proper training of these sales engineers is usually given a great deal of consideration. The article or articles which are to be marketed are studied that the sales engineer has the confidence which comes from knowing the article he is selling "from A to Z." His competition is carefully analyzed and he is intensively trained in how to bring out the selling points of his article. He spends a large part of his training period in learning the methods of selling his article or service—he is carefully schooled in the science of salesmanship.

Training the Engineer to Sell

We often hear it said that "John Jones certainly knows how to make industrial gas applications, but for some reason or other does not seem to be able to make sales." This is a charge that is frequently brought against the industrial gas engineer—that he is well developed technically and mechanically, but not at all in salesmanship. The sad part of this story is that it is very largely true. If there is anything that we need in the industrial gas end of the business it is men who can sell—men who know and who can apply the fundamental principles of salesmanship.

We are just beginning to realize the importance of making careful surveys and cost analyses of the various competitive heat operations in the factories. But have we taken any very definite steps in training our men in the methods of cost analysis? Have we analyzed our competition as we should? The meagre store of data that the individual gas man has on industrial gas applications is a point that cannot help but impress one whose work carries him in that phase of our industry and only now are we recognizing that such data must be collected and made available to the industrial gas engineer if we are to be able to convince our potential customers that gas, from the standpoint of the economics involved, is the best fuel for his heat processes. Have we selected the men who are to carry on this work with the care we should have given to this problem?

(Continued on page 60)

The Value of Home Service*

What it does for the customer and for the gas company

Ada Bessie Swann

Chairman Home Service Committee of American Gas Association

HOME Service Departments of gas companies are actually bringing about a social revolution in the communities in which they operate.

They are establishing new conventions, habits and customs, based on a new conception of home management and the elimination of drudgery in connection with the activities of the home, the activities that are necessary and fundamental requisites for the production and carrying on of life.

The very basic principles of life have undergone a revolution—one now works to live—not lives to work. But so works that life shall be the fulfillment of great good health, some wealth and happiness.

Modern science and invention has been responsible for a great deal of this change. Woman, herself, is also responsible, as she has slowly rebelled against the old-time methods of drudgery and constant hours of labor.

A Fact of Tremendous Social Importance

The Home Service phase of a gas company activity is a fact of most tremendous social significance.

Gas companies are capitalizing certain forces and circumstances which preceded their own interest in Home Service; they are taking advantage of the far-reaching publicity in women's magazines, in newspapers, in Home Economic work of schools and colleges, but do gas companies realize that the gas industry is rightly the logical party to carry on and keep alive this stimulated accumulated interest?

They have not, but are now just beginning to. I say "beginning," because we have been very slow to take advantage of all of the accumulated and stimulated interest that has been done for us by somebody else. Now it is time for us to dominate and lead in this great movement of Home Service. Newspapers, magazines, our colleges and our manufacturing companies have already stimulated a great accumulated interest in things for the home, which we, as an industry, should profit by.

In working up an exhibit that I want to use next year, I was amazed at the valuable material I received, all of it free, from business organizations catering to the home-maker.

Ada Bessie Swann

Various Companies Maintain Home Service Departments

For instance, why does the Interwoven Rubber Company maintain a Home Economics Department? Why does the Goodyear Company maintain a Home Economics Department? They make tires for automobiles, and certainly it's a man's job to change an automobile tire. Why do the Sherwin-Williams people maintain a Home Economics Department If any job was ever a man's it's paint, and yet the Sherwin-Williams people and the Goodyear Rubber Company and the Interwoven Rubber Company this year have compiled over 24 pieces of the most attractive and most valuable information for the woman in the home—Sherwin-Williams on home decoration, the Goodyear Rubber Company on canning—(yes, as a side issue, they manufacture rubbers that go on cans of fruits and vegetables), but they think that it is important enough to issue 24 pieces of literature on cookery recipes to place in the hands of the woman. They want the woman's patronage. And if it's important for a rubber company and a paint company to maintain a Home Service Department, how much more important it is for the gas company!

We have a product the same as the paint and rubber people; we must devise ways and means of serving our product just as attractively and just as intelligently as any other company that I know of.

The gas company, as I say, should dominate the Home Service work, because no other industry is in a better position to profit by the tremendous amount of social propaganda which has been done and is being done, nor has a better right to profit by it. Nor is there any other industry which has a greater community obligation to discharge in taking advantage of this social and economic situation.

Heat Essential to Life's Comforts

The reason is plain, for the three necessities of modern life are food preparation, cleanliness of body, clothing and environment. These are the chief contributions to the comfort and convenience of what is meant by modern life.

And the essential requirement of each requisite is heat; heat in unlimited quantities, economically de-

(Continued on page 61)

*Read before 18th annual convention, Canadian Gas Association, Quebec, Can., July 15-16, 1925.

Air Required for Combustion of Gas*

A method for determining the air necessary for combustion and loss in stack when gas is used as a fuel

P. Hetzler

THE heat loss in the flue gases, when a solid fuel is employed in the furnace, can be very readily determined with the aid of the approximate formula:

$$0.65 \times \frac{T - t}{CO_2}$$

but in the case of gas-fired apparatus there is no such formula available, as the general formula $R_v.C\ (T - t)$ contains the term R_v, which is the volume of the flue gas, and this must be known before a calculation can be concluded. The determination of R_v and also of the quantity of air that is required for combustion may be carried out mathematically with a sufficient degree of accuracy in the case of blast furnace gas and producer gas made from coke, as both these gases generally contain no ingredients that cannot be easily and quickly determined by the usual methods of gas analysis.

Conditions for Other Gases

But the condition is different for the other gases, such as water gas, coke oven gas, coal gas and producer gas from soft coal, in which there are always found hydrocarbons of the general formula C(n)H(m) are very difficult to separate from one another by analytical means. Furthermore, each one of these hydrocarbons will require a different amount of air for complete combustion, so that the calculation of the amount of air required for combustion and of the quantity of carbon dioxide and water vapor developed by this combustion is not possible with any degree of accuracy. And when the quantity of air for combustion and the volume of flue gases developed in the burning of the gas are calculated for the case of an incompletely prified and high-sulphur content gas, then the task is a very difficult one, indeed, as the analysis of such gases is tedious and time-consuming, and a special apparatus, which is not available everywhere and which is difficult to manipulate, must be employed in the analytical process.

Difficulties Found in Experimental Work

All these difficulties which were met with in the investigation made on the use of an unpurified coke oven gas gave the author an opportunity to use methods of gas analysis which clearly showed him the necessity of a more simple and less time-consuming method. It showed him clearly the need for a simple apparatus in which there could be determined the percentages of oxygen, nitrogen and carbon dioxide present in the gas, the quantity of air required for the combustion of a unit volume of the gas, the volume of the gases of combustion that result from the burning of a unit volume of the gas, the hydrocarbon content of the original gas and the heat loss in the flue gases. An investigation was accordingly made which yielded the following method and apparatus, which are described below. The apparatus that was used in this analytical method is seen in figure 1.

Description of Apparatus

The apparatus was used to make a complete analysis of the gas and also for the determination of

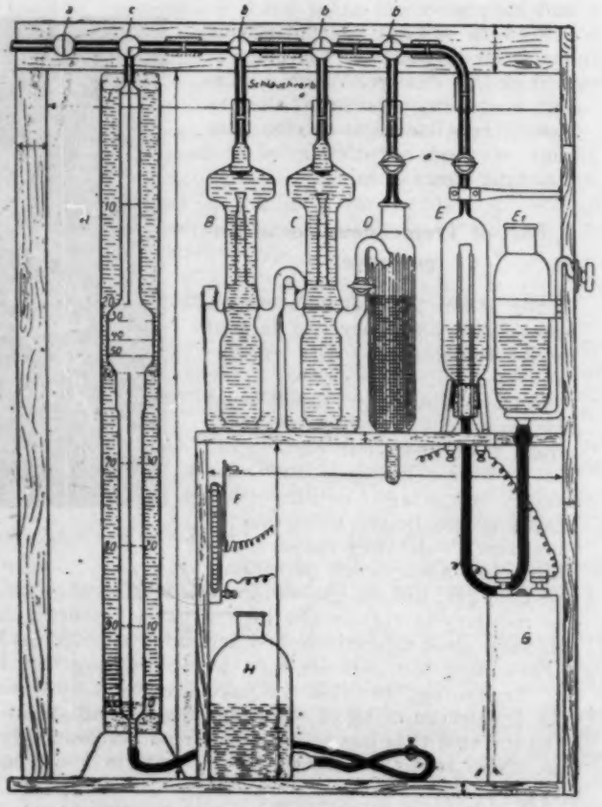


Fig. 1—The Analyzing Apparatus

the volume of air that was required to effect theoretically complete combustion of one volume of the gaseous fuel. In figure 1a is a simple gas cock. A three-way cock is shown at b, and c is a three-way stop-cock with an opening through the end of the

*Translated especially for the American Gas Journal, from Das Gas und Wasserfach, 1925, pages 306ff.

(Continued on page 57)

GAS WRINKLES

WRINKLES NOS. 7-10

Use for a Red Brick

(By J. J. Jessup, Foreman of Machine Shop, San Diego Consolidated Gas & Electric Company)

In tinning metals the acid is frequently slow to act. Rub the surfaces to be tinned with piece of clean red brick and note how easy the tinning becomes.

Non-Marring Pipe Wrench

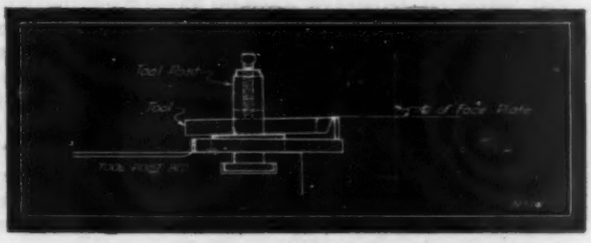
Where it is not desirable to use a pipe wrench on metal to be turned, due to crushing or marring the surface, double a rope, thus forming a loop. Pass this loop two or three times around the pipe or metal to be turned. Insert tool handle or other suitable lever in loop, hold taut the ends of rope and use as a pipe wrench. This is very suitable in inaccessible places, as there is no lost motion in backing up for a new grip after completing a stroke.

Do Not Overheat Babbitt

In pouring babbitt metal into small spaces there is always a tendency to overheat it, to insure a good pour. In this securing a "good pour" the metal is destroyed, due to the loss of the tin. Put a little sal-ammoniac in your babbitt and it will run freely without overheating.

Locating the Proper Height of Lathe Tools Quickly

When using a thread or cutting-off tool, it should be set exactly on center line of face plate. By using a gauge like sketch this can be done in less time than it takes to tell about it. Take a piece ⅜ or ½ inch



square cold rolled steel about 6 or 8 inches long, drill and insert a piece of ¼ inch rod in one end at 90 degrees, having ¼ inch rod just the height so when square stock lies flat on tool post block the ¼ inch rod is at level with point of lathe centers. (See sketch.)

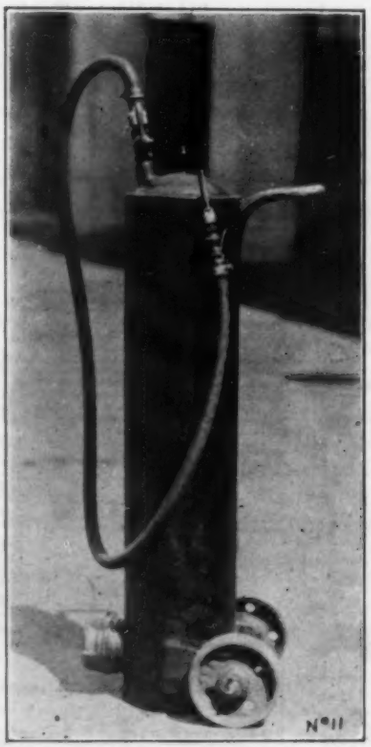
WRINKLE NO. 11

Automobile Grease Gun

(C. E. Storm, Garage Foreman, San Diego Consolidated Gas & Electric Company)

Accompanying photo shows a very useful method of filling the differential cases of autos.

Cylinder is 3 feet of 8-inch pipe with heads welded in. The pipe to which hose is attached extends to one inch from bottom. Near bottom is filling hole, plugged with 3-inch plug. In center of top is an auto tire valve.



Tank is filled about one-half with differential grease and the tank is put under air pressure, which in our garage is 150 pounds.

In addition to the stop-cock, the hose is equipped with thumb cock and nozzle, through which grease is forced by the air in cylinder.

Hot Water For Summer Use

How some gas companies campaign for this business

W. B. Stoddard

OF course people ought to think about their supply of hot water for the summer before the furnace fire is allowed to die in the spring, but the majority of them don't; and not until they are forced to heat their water on the range do they give the subject much attention. For that very reason there is no better time to conduct a gas hot water heater campaign than in the dog hot days. Any housewife who has stewed in a hot kitchen while heating water for the dishes, or any man who has sweated in a hot room while waiting for hot water for his bath is in a frame of mind to heed the suggestion that he may have all the hot water he wants, without himself getting cooked at the same time, by installing a convenient gas water heater.

One Way of Attracting Attention to Hot Water

An interesting campaign conducted by the Mobile Gas Co., Mobile, Ala., made good use of the Harold Lloyd comedy, "Hot Water," which was being shown at a local theatre. Through arrangement with the management they had one of their storage heaters set up in the lobby, and a demonstrator on hand afternoon and evening, who showed that hot water could be had at the turn of the faucet. He also had literature on the subject of gas hot water heaters, which he gave out to all patrons who displayed any interest. These folders explained not only the convenience of the heater itself, but the reasonable terms on which one could be obtained. They also linked up with "Hot Water" at their own salesroom by having a window display of sveral types of heater and tank, together with pictures of scenes from the play. A card observed:

You Will Like
HOT WATER

Both that into which Harold Lloyd got, and that into which you get through the convenience of a tank water heater in your home.

Cards sent out to all their patrons invited them to

See Harold Lloyd in "Hot Water" at the Bijou this week. See our display of Gas Water Heaters in the lobby of the theatre.

We are having a special sale this week. Gas Water Heaters sold at a saving of from $10 to $22. Come down to the salesroom and pick out the type you want. Hot water at the turn of the faucet all the time. $5.00 down and ten months to pay.

An Actual Bathing Demonstration

For a striking method of bringing the public to see their demonstration of gas tank heaters, the Northern Indiana Gas Co., of Hammond, Ind., certainly earned the palm. Through the co-operation of one of the leading plumbers in the town a complete bath room was installed in the display window. No detail was omitted and when done it was a bath room of which any householder might be proud. At one side was the tank and hot water heater. Arrangements were made with a colored woman to give her young hopeful several baths in this room on Saturday evening preceding the special sales campaign. A story regarding the proposed ablutions was run on the front page of newspaper the day preceding the demonstration, together with a cut of the model bath room. To say that it was a drawing card was to put it mildly. The public came in crowds, and grinned delightedly every time the little black head appeared above the sudsy warm water. The salesroom was kept open that evening, and many who saw the window demonstration strolled inside, and all the salesmen were kept busy explaining the operation of the heater, the cost of same, and the terms on which it could be obtained.

$1 Down Will Place a Tank Water Heater in Your Home
$1
COME to the Gas Company's office today and save from $10 to $22.50 on a Water Heater. Four types are offered by this sale, two of which are illustrated below. The one shown to the right may be had for $1 down. The one to the left may be had for $5 down, as may all others offered by sale. The purchase of a Heater assures your family all year round Hot Water Comfort at extra low cost. And the sale offers a saving on first price (with privilege of FREE installation) of from $10 to $22.50.
The Prices Offered by This Sale Give You a
Saving of $10 to $22.50
Ten Months Are Allowed to Pay For Heaters
The Humphrey Heater
Regularly Priced at $147.50
Now Priced
$125
This Hot Water convenience automatically maintains a large tankful of hot water all the time. You simply turn a faucet and the hot water flows.
$5 Down
10 Months to Pay
$10 Allowed on Old Automatic Heaters
The Gas Company will allow you $10 on your old, used automatic heater. Allowance applies to automatics only.
The Gas Company also has on hand a supply of Used Heaters which are being sold at as much as $50 below cost.
P.S.—See "Hot Water" at the Bijou Today
Here's A Tank Heater
Regularly Priced at $57.50
Now Priced
$47.50
This type of heater requires a tank. The sale price of $47.50 ($10 off regular price) includes the tank and installation.
$1 Down
10 Months to Pay
MOBILE GAS COMPANY

An Ad That Helps Sales

(Continued on page 54)

INDUSTRIAL GAS LESSONS

IF IT'S DONE WITH HEAT — YOU CAN DO IT BETTER WITH GAS

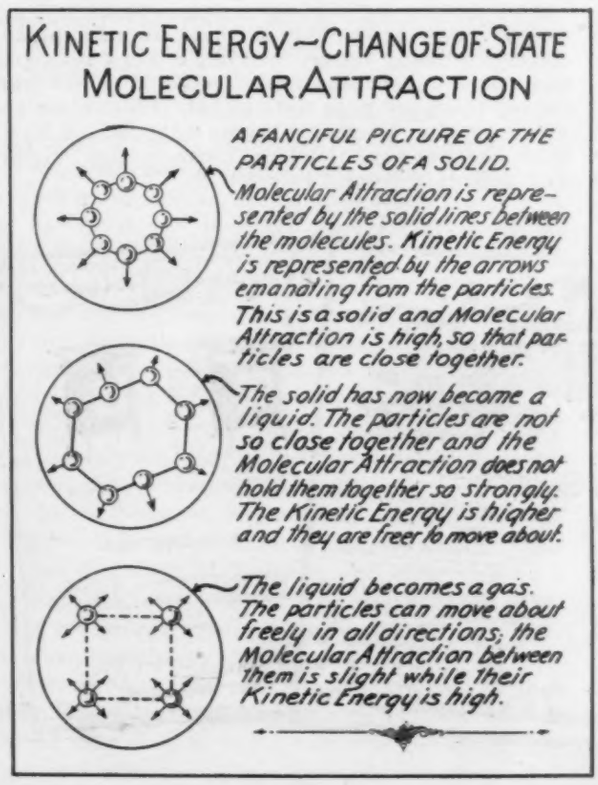
Lesson No. 79

Heat and Change of State

The Effect of Heat on Kinetic Energy

The question that interests us is what is the effect of heat on the kinetic energy possessed by particles of matter. It is assumed that the kinetic energy of the particle of matter in the solid state is least, that in the liquid state next and that in the gaseous condition greatest. It is evident then that the application of heat to the solid, which converts it into the liquid state, or to he liquid which converts into the gaseous condition, serves to increase the kinetic energy of the particles of matter. In other words, converting a solid into a liquid, or a liquid into a gas, merely means increasing the kinetic energy of the particles of matter.

It has been mentioned above that a solid will not change to the liquid condition unless it is first brought up to the melting point and then a certain definite quantity of heat is supplied to it. This heat thus supplied and not manifested by a rise in the temperature is called latent heat. It may, therefore, be deducted that the latent heat of fusion, which is supplied to the solid in order to melt it, is absorbed by the particles of the solid matter wherewith their knetic energy is increased until it becomes possible for the solid to exist in the liquid condition. The same reasoning can of course be applied to the vaporization of liquids, their conversion into the gaseous condition.


KINETIC ENERGY—CHANGE OF STATE
MOLECULAR ATTRACTION
A FANCIFUL PICTURE OF THE PARTICLES OF A SOLID.
Molecular Attraction is represented by the solid lines between the molecules. Kinetic Energy is represented by the arrows emanating from the particles. This is a solid and Molecular Attraction is high, so that particles are close together.
The solid has now become a liquid. The particles are not so close together and the Molecular Attraction does not hold them together so strongly. The Kinetic Energy is higher and they are freer to move about.
The liquid becomes a gas. The particles can move about freely in all directions; the Molecular Attraction between them is slight while their Kinetic Energy is high.

Kinetic Energy and Molecular Attraction

In fact, the whole proposition can be considered as a struggle between the molecular attraction which holds the molecules of solid or liquid together and the kinetic energy of motion with which these molecules are endowed. When heat is applied and this kinetic energy is increased, it becomes great enough to overcome in part the molecular attraction between the particles of the solid and the solid is converted into a liquid. The same phenomenon takes place in heating a liquid which is finally changed into a gas.

A clear understanding, therefore, of what happens when the solid becomes a liquid or when the liquid becomes a gas, and also vice versa, when in cooling the gas condenses to a liquid and the liquid solidifies to become a solid is necessary before the gas engineer can intelligently approach any heating problem such as steam making, or the melting of brass, which involves change of state.

CITY GAS BECOMES JACK-OF-ALL-TRADES IN WESTERN RAILROAD SHOPS

City gas, turned into heat-treating furnaces and portable blow torches, has been adopted by a number of railroad shops throughout the country as a means of cutting down operating costs. By using gas fuel for repair purposes, it has been found possible to salvage much rolling stock and other material which had formerly been scrapped.

Considerable saving along these lines and satisfactory results in other particulars are reported by the Western Pacific Railroad, whose yards and shops at Sacramento, Cal., have been piped with a carefully laid out gas distribution system. In spite

of the proximity of these shops to the source of oil, gas furnaces have replaced oil furnaces with satisfactory results in a territory where most of the gas is made from oil.

The furnace used for heating springs has been found to be most satisfactory. Not only are the springs evenly heated, which was almost an impossibility before, but they come out practically free from scale. After being shut down overnight, the interior of the furnace is still a dull red glow in the morning, as a result of the good insulation.

Owing to this insulation, the furnace is comparatively cool to the touch at all times and the men working around it do not suffer from radiated heat as formerly.

Gas-fired equipment has been developed to salvage boiler tubes by welding on new or "safe" ends. The shops reported that the cost of the necessary equipment was saved during the first month's operation. One piece of equipment necessary is a hot saw, which is used in cutting off the ends of flues and of the safe ends.

Gas torches instead of acetylene torches are used to straighten locomotive frames, which are sometimes bent as the result of an accident. These gas torches are also used for drying thermit weld molds, as the gas flame dries them quickly, and, what is more important, leaves them perfectly clean.

Steel tires are constantly renewed by the use of gas, which eliminates the necessity of making complete new drivers, and also of weakening them with bolt holes and at the same time making certain that they will remain in place. The tires are machined to within a fraction of an inch less in diameter than the driver. Then, by heating the tire, it expands so that it can easily be slipped on the driver. On cooling, it contracts and is held in place by the tremendous strain developed when the driver prevents it from returning completely to its original size. After the tires are worn they are removed in the same manner, namely, expanding them with gas heat.

What They Advertise And How

William H. Matlack

WITH the growing interest in advertising, the editor of The American Gas Journal thinks folks here and there will welcome a thumb nail review now and then of newspaper and direct advertising. As he has put it up to me to do the job, the above is the head we have decided to run for our review. We will take the advertisements as we find them and leave it to you to be judge and jury. It will not be our purpose to pick at any of the advertisements we reproduce. Of course, we reserve the right to rave over an advertisement now and then, for the advertising gas man is putting out some mighty fine things these days.

The ones reproduced here come from "all over." One from Cuba says but little, as we do not "sabe," but we can see that the border and signature are distinctive. Another number 2, comes from Egypt, and employs a timely theme. We like to see a set signature to all advertisements. Number 3 comes from the big town and goes right to bat. Illustration and all are timely. Number 4 comes from the old North State and was very timely. "Emancipation" always gets attention around July 4th.

As The Journal Views It

TRAINING INDUSTRIAL GAS ENGINEERS

Ours is the age of specialization. We find in all industries and in all fields of human endeavor men being trained for special tasks. Modern manufacturing methods, modern ways of doing business, of selling products and of running our organizations, has practically done away with the "Jack-o'-all-Trades." There is place today in the well-organized and up-to-date business enterprise only for the well trained man, the one who understands how to do a certain work well.

It is accordingly very important to both the man and to the industry that he be well trained and adequately equipped to do his work. This applies very particularly to the industrial gas engineer and it is very strongly urged upon the reader that he give careful attention to the article that is published in the present issue of the American Gas Journal on this highly significant subject.

It brings up the subject of the training of industrial gas engineers, or, rather, the seeming lack of training that most industrial men have. This is not so much a commentary on the man himself as it is on the gas industry. It would appear that there are still many gas companies who do not appreciate the fact that they must possess in their organizations properly trained industrial gas engineers if they expect and hope to get a real share of the industrial fuel business. It is not possible for the untrained man to enter the industrial gas field and to be victorious in the commercial battle unless he is well equipped in every way to meet and defeat his competitors. The industrial gas engineer must therefore be well versed not only in all technical and scientific matters pertaining to thermal processes and the use of industrial fuels, but he must also be a thorough salesman. He must be able not only to interest the prospective customer in gas as an industrial fuel, but also to sell him gas.

There is no question but that the training of such a man involves considerable trouble and expense. It may be very easy to find a man who has great selling ability or one who has deep technical knowledge, but it is a very difficult matter either to train the salesman to become an engineer or the engineer to become a salesman. It is a much mooted question which of the two is the easier task. But it can and must be done, if the gas industry is to secure its proper share of the industrial fuel business and if it eventually is to reach its goal as the universal fuel.

It must here again be brought to the attention of gas men that in the industrial field gas is by no means a monopolistic industry. It has to compete with other fuel, particularly electricity and oil. Gas men must not be deluded by the fact that depletion of oil in the near future will automatically remove a competitor in the industrial field. They must not think for the moment that this means that the industrial business enjoyed by oil will be bequeathed to gas as a matter of course. It is not at all sure, in fact, that this industrial business will be released at all, for there are other sources of oil, such as oil shale, of which this country possesses great quantities, and which might, under proper conditions, become the important raw material in petroleum manufacture. Then, again, there will be others who will put up a strong fight to secure the business if it really is released.

The gas man in the industrial business is constantly in contact with trained engineers. He will have to compete with them even more determinedly and successfully in the future if the gas industry is to obtain its share of the industrial business and he cannot do so unless he is at least as well trained as his competitors.

Thus, it may be said, that the future of industrial gas depends very largely upon the character of the industrial gas engineers, on the way in which they are trained and on the ability that they have to sell, not only thermal knowledge, but the gas fuel itself. Hence it is up to the gas industry and the gas companies that comprise it, to take proper steps to see that its industrial men are well trained, that they are sent out to accomplish their tasks provided that a proper understanding of all the manifold factors and phases that characterize the industrial gas field.

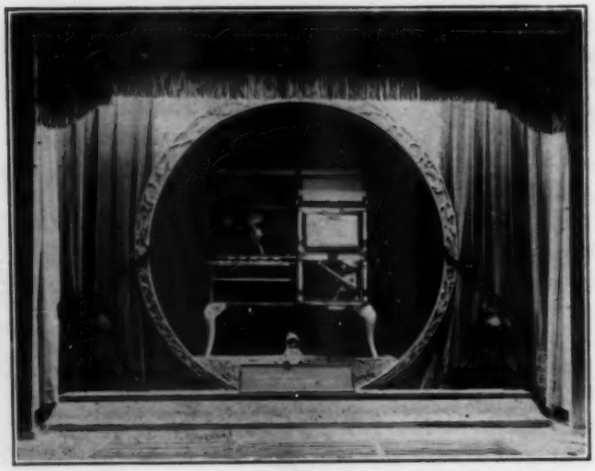
A Wonder Window Display

Glorifying the gas range in St. Louis

M. H. Tamlan

THREE cheers for S. C. Rieser, display man for the Laclede Gas Light Co., St. Louis, for he has dispelled the idea that gas appliances cannot be artistically, tastefully and attractively displayed.

During the convention of the International Association of Display Men, which was held in St. Louis during the week of June 15-20, Mr. Rieser was invited to demonstrate what he considered to be the most attractive and effective method of displaying gas appliances. with the result that he not only proved, conclusively, that gas appliances can be displayed as effectively as other merchandise, but he went a step farther and proved that they offer just as many opportunities for creative ability and originality as any other class of merchandise.



Taking a single gas range and setting it in a golden oval frame, surrounded by elves and simple draperies, Mr. Rieser produced one of the most beautiful displays we have ever seen. The stage and its properties would be a fit setting for a display of diamonds (to be sure, a gas range is the diamond of the kitchen) or other precious stones.

Description of the Window

The reproduction of this Wonder Window is well worth study. Note all frills that usually mar window displays have been omitted. Mr. Rieser has taken a single appliance and set it in a carefully thought-out setting. Hs properties are few and well chosen, each one is a necessary part of the picture. Even the "display caption" indicates a carefully thought-out idea, care and consideration. It indicates that the artist was aware of the fact that pretty pictures are often poor advertisements—that they ofen fail to sell even an idea—and he put a selling message on his window.card: "Not solid gold—but worth its weight in gold."

Can't you hear the Mrs. say "that is the truth" as she gazes at this beautiful white and nickel gas range. Truly Mr. Rieser has a good knowledge of "Window Selling—the Genteel Art of Attraction"* and he has applied this knowledge successfully to gas appliances.

The Laclede Gas Light Company was also recently notified by the Merchant's Record and Show Window of Chicago that they had been awarded the first prize for the best window display in that publication's monthly contest for March. The window display on which that award was made was composed of a series of allegorical paintings picturing the evolution of heat. Those windows were also Rieser windows.

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*American Gas Journal, January 31, 1925.

Advertising Customer Ownership

A novel circular employed to assist stock sales.

Frank H. Williams

THE Southern Counties Gas Company, which operates in Santa Ana and a number of other Southern California cities, is issuing $1,250,000 of 7 per cent preferred stock, and in advertising this issue the company has used a particularly interesting circular which may offer suggestions to other companies for use when they are advertising stock issues of their own.

The company's circular, in telling about the investment, is divided into two sections. The first section deals with the security of investment and the second with special advantages the stock possesses.

Operations Discussed

The first section is divided into six parts, dealing with the wide field of operations—the company operates in 52 cities in the counties of Los Angeles, Orange, San Bernardino, Ventura and Santa Barbara; the exceptional growth of the company from

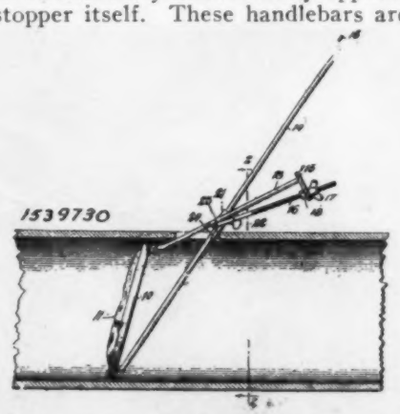
(Continued on page 62)

PROGRESS IN GAS TECHNOLOGY
Domestic and Foreign

GAS MAIN STOPPER

THE gas main stopper which is shown in the accompanying illustration is patented in the United States patent 1,539,730.

As is shown, the stopper has handlebars which are pivoted at substantially diametrically opposite points on the stopper itself. These handlebars are shown



at 13 and 14. One of the handlebars has an adjustable sleeve and is provided with means for engaging the opening in the gas main. This is shown at 24. Means are also provided on the other handlebar for exerting pressure so as to lock the stopper in the main. A device is provided at the front of the sleeve for engaging with the pressure device on the second handlebar.

A GAS ABSORPTION PIPETTE

THE pipette illustrated has several features which render it more convenient to use and give it advantages over other forms.

The capillary delivery, F, of the burette is turned up and drawn out, the turned up portion passing through a rubber stopper on which is fitted a short length (about 2 in.), A, of ⅝ in. glass tube forming the reservoir for a mercury seal.

The absorption bulb, B, is made from a 100 c.c. pipette the wider tube of which is cut off 1½ in. from the bulb and has a bore sufficiently large for it to slip over the capillary. Into this end of the bulb is sealed also a short length of ¼ in. glass tube, while to the other end of the pipette, the narrower tube having been cut off short, is sealed a tap, D, carrying a small funnel, G.

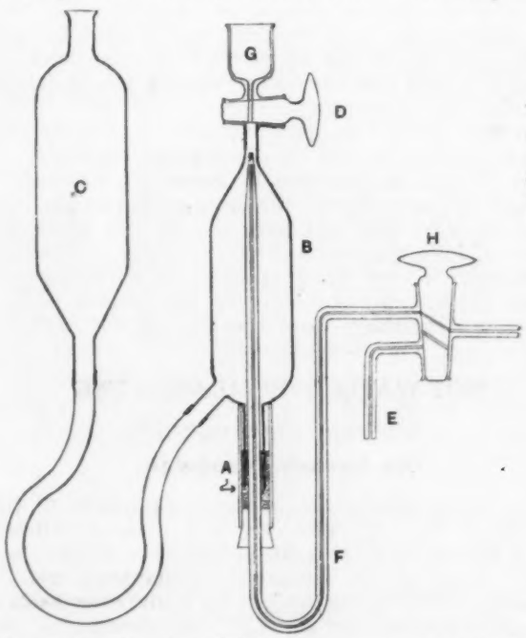
Another 100 c.c. pipette, C, cut down at both ends, is connected to the first by a piece of rubber tubing about 12 in. long.

Preferably the wider tube of the pipette, C, is expanded or replaced by a piece of ½ in. tubing so that liquid may be poured into it more conveniently.

The pipette, B, is slipped over the capillary and the position of the rubber stopper so adjusted that when the bulb is resting on the tube, A, the end of the capillary is just touching the plug of the tap, D. Mercury is poured into the seal to a depth of 1½ in. and the apparatus is ready for use. The tube, A, and the pipette, C, are supported by clamps (not shown).

To carry out an absorption, C is unclamped and lowered until the top is about level with the bottom of the bulb, B, and the reagent poured into it. The tap, D, is then opened and C raised until B is filled just to the level of the bottom of the funnel; D is then closed and C clamped in position.

The gas is then driven over into B by raising the mercury reservoir of the burette. The capillary



tube, F, is of course filled with mercury at the commencement of the analysis before the gas sample is drawn into the burette through the capillary, E. When absorption is finished the gas is taken back into the burette, following up with reagent in F as far as the stopcock, H.

Now by opening the tap, D, lowering C and tilting it, the reagent in B may all be transferred to the reagent bottle from which it was taken, after which both bulbs, B and C, can be washed out with water if convenient or necessary, before a second reagent is introduced.

The advantages of the pipette are more apparent when using a reagent such a bromine water, which fouls mercury.

After absorption by this reagent, without taking the gas back into the burette, it can be washed in

the bulb, B, in this manner. A few c.c. of strong potash are put into the funnel, G; C is then lowered to its full extent so that the gas in B is under a slightly diminshed pressure. The rubber tube is then clipped close to B, and on carefully opening the tap, D, alkali is drawn into B and absorbs the bromine vapor in the gas. Before doing this, in order to avoid waste of bromine water, with the clip in position the bromine water may be poured out of C and replaced by water or alkali, and air in the rubber tubing being driven out by gently drawing it between the fingers before the clip is opened again prior to drawing the washed gas over into the burette.

If desired, agitation of the absorbing reagent in B when in contact with the gas is easily effected by lowering and raising the mercury reservoir of the burette, thus passing the gas backwards and forwards into the pipette, H being kept open meanwhile, but taking care that during the operation none of the reagent is drawn through the capillary past H.

It may be objected that after an absorption with one reagent the next reagent gets fouled by the small quantity of the former left in the capillary and discharged into the bulb when the gas is driven over for the second absorption.

In most cases this does not matter, and in any case it can be avoided by making the capillary between H and the burette long enough to contain enough mercury to fill the upturned portion, and when drawing gas back into the burette after absorption, following up with mercury drawn through E, then driving out the reagent in the upturned part of the capillary by the mercury thus drawn in, before emptying the bulb of the reagent.

HOT WATER FOR SUMMER USE

(Continued from page 48)

An Intensive Campaign

For quick results the intensive campaign of the Wisconsin Gas Co., Racine, Wis., was a winner. They did not sell the tank—simply the heater, and every detail of the campaign was planned well in advance. Advertising backed up by intensive salesmanship, formed the line-up. The feature of the sale was the installation of a double copper coil tank water heater to the patron's present tank equipment, at a special price during a ten days' sale —$18, $1 down and $1.50 a month. Newspaper ads, inserts with the monthly gas bills, and special folders were all printed. The keynote of all the advertising was "One dollar puts a tank heater in your home" and folders on this subject were mailed to 12,500 consumers. Three days before the sale started the newspaper advertising commenced. Every day during the sale a big ad appeared. During the ten days 500 heaters were hold. Every patron was anxious to have his heater connected as soon as possible, and the work was started at once. Quick action tank couplings were used and the installation of each heater was completed in less than an hour, ready for hot water service.

Effective Displays Aid Sales

The Peoples Light Co., Davenport, Iowa, was another concern that put on a successful hot water campaign for summer with great success. They used in the newspaper and direct mail publicity the slogan "$2.50 down installs hot water in your home." Much of the success of their campaign they traced to their effective display. The front of the salesroom is of glass and there are no windows, in the commonly accepted sense, all the merchandise standing on the floor. In order to focus attention on their tanks and heaters they built up in the front of the store a background of checked paper in two

A Hot Water Display in Davenport, Ia.

shades of blue, with platforms on which the heaters stood covered with similar mats. Heaters of different sizes were shown, and with them cards of white lettered in two shades of blue. Among them were:

Hot Water—$2.50 down—Always ready.
Hot water in any part of the house at your command.
$2.50 down installs hot water in your home.
Installed, under special payment plan, $97.50.
$2.50 down, easy payments, no interest.
Pay for using hot water while you are enjoying it.
HOT WATER for Bathing, Shaving, Cleaning, Laundry, Dirty Dishes.

Another Fine Window Display on Hot Water

A decidedly "nifty" display was arranged by the Peoples Gas Stores, Chicago, to feature the tank and water heater. The window was backed with wall paper in two shades of lavender, and across the top were appliqued paper morning glories in all their natural colorings. An opening was cut in the rear wall, and here was shown a miniature stage, painted green, with curtains of old rose, drawn back to show a small cardboard figure using a vacuum

(Continued on page 62)

Catechism of Central Station Gas Engineering in the United States

Installment No. 79

(Continued from last week)

Rondelet's Rule

"A formula known as Rondelet's Rule is sometimes given, this is $T = \frac{LH}{N\sqrt{L^2 + H^2}}$, in which

H = Height of wall.
L = Length between cross walls.
T = Thickness of wall.
N = A constant, being 10 for brickwork, 12 for finely cut stone, 8 for imperfectly cut stone, and 6 for rubble.

"Thus to find the thickness of the wall of a building 60 ft. long, 60 ft. wide and 30 ft. high we have by substituting $T = \frac{30 \times 60}{10\sqrt{3600 + 900}} \times 2$ 2-3 ft. or 32 in. thick throughout its height and length.

Another Useful Formula

"Berg, in his book 'Safe Building,' deduces a formula from Rankine's formula for long pillars, which is:

$$w = \frac{a\left(\frac{c}{f}\right)}{1 + \frac{l^2 n}{r^2}} \qquad (1)$$

Where w = Safe total load on the pillar.
a = Area of cross section in inches.
l = Length in inches.
r^2 = The square of the radius of gyration of the cross section.
$\frac{c}{f}$ = Safe resistance to crushing per square inch where c = total resistance to crushing and f = factor of safety of 10.
n = constant for brickwork 0.0033.

"Instead of using the height l in inches the formula may be modified to use it in feet. Substituting 12L for l, and the known value 0.0033 for n, we have

$$w = \frac{a\left(\frac{c}{f}\right)}{1 + \frac{144L^2 \times 0.0033}{r^2}} \text{ or } w = \frac{a\left(\frac{c}{f}\right)}{1 + 0.475\left(\frac{L^2}{r^2}\right)} \qquad (2)$$

Where w = Safe total load on piers, chimney or tower in pounds.
a = Area of cross section of pier in square inches at any point of height.
L = The height of wall in feet above said point of masonry.
$\frac{c}{f}$ = The safe resistance to crushing, per square inch.
r^2 = The square of radius of gyration of the cross section in inches.

"If it is more desirable to use feet and tons we take w = 2000 W, a = 144 A, and $r^2 = 144P^2$ and substituting we have

$$2000\,W = \frac{144A\left(\frac{c}{f}\right)}{1 + 0.475\left(\frac{L^2}{144P^2}\right)} \text{ or } W = \frac{A\left(\frac{c}{f}\right)}{14 + 0.046\left(\frac{L^2}{p^2}\right)} \qquad (3)$$

Where W = Safe total load on masonry in tons of 2000 lb. each.
A = Area of cross section of masonry at any point of height in square feet.
L = Height in feet from said point to top of wall.
$\frac{c}{f}$ = Safe resistance to crushing in pounds per square inch.
P^2 = Square of radius of gyration, all dimensions taken in feet.
$\frac{c}{f} = \frac{1500}{10} = 150$ for good brickwork laid in lime mortar.

Use of Formula

"When walls are long, without cross walls or buttresses, a piece of the wall is taken, one running foot in length, considering it to bulge inwardly or outwardly so that r^2 in formula (1) would equal $\frac{d^2}{12}$ where d = thickness of wall in inches. The area would then be, in square inches, a = 12d.

"Substituting these values in formula (2) we have

$$w = \frac{12d\left(\frac{c}{f}\right)}{1 + 0.475\frac{L^2}{d^2}} \text{ or } w = \frac{d\left(\frac{c}{f}\right)}{0.0833 + 0.475\frac{L^2}{d^2}} \quad (4)$$

If it is preferred to use tons and feet, insert in formula (3), A = D, where D = thickness of walls in feet, and also the value of P^2 = which is $\frac{D^2}{12}$ and we have

$$W = \frac{D\left(\frac{c}{f}\right)}{14 + 0.046\frac{L^2}{D^2}} \text{ or } W = \frac{D\left(\frac{c}{f}\right)}{14 + 0.552\frac{L^2}{D^2}} \quad (5)$$

Where W = Safe total load in tons of 2000 pounds on each running foot of wall D feet thick.

D = Thickness of wall in feet at any point of its height.

L = The height in feet from said point to top of wall.

$\frac{c}{f}$ = Safe resistance to crushing in pounds per square inch.

f = 10, c = Resistance to crushing of material used.

An Example

"Assuming a purifying house to be 60 feet long, 60 feet wide and 30 feet high, the distance between the beams supporting the purifying boxes and the roof to be 18 feet, and the distance from the beams downward to the foundation 12 feet; we first find the thickness of the wall above the beams and then the thickness of the wall below the level of the beams.

"In using formula (5) substitute for D different thicknesses until the safe thickness is found.

"Using the formula for determining the proper thickness of the wall for the above purifying house.

Formula:

$$W = \frac{D\left(\frac{c}{f}\right)}{14 + 0.552\frac{L^2}{D^2}}$$

assuming a thickness of 2 feet.

"The load per running foot above the beams supporting the boxes would be,

18 ft. (height) × 2 ft. (thick) × 112 lb. (weight of cu. ft. brickwork) = ...	4032 lb.
30 × 80 lb. (weight of roof including wind and snow) = ...	2400 lb.
18 ft. (height) × 30 lb. (wind pressure per sq. ft) = ...	540 lb.
	6972 lb.

or 3½ tons.

"The safe load on a 24 in. wall 18 ft. high would be

$$W = \frac{2 \times 150}{14 + 0.552\frac{18 \times 18}{2 \times 2}} = 5.11 \text{ tons, or } 10{,}220 \text{ lb.}$$

"The wall would be safe enough if ½ or ¼ of the wall were used up in openings.

"Assuming the wall to be 30 in. thick below the beams, we have,

Load above beams per running foot.....	6,972 lb.
Weight of wall, per running foot, 12 × 112 lb. × 2½	3,360 lb.
Weight of boxes and beams per running foot, 30 × 400 lb.....	12,000 lb.
Wind pressure, per running foot, 12 × 30 lb.	360 lb.
	22,692 lb.

or 11½ tons.

"The safe load on a 30 in. wall 12 ft. high is $W = \frac{2.5 \times 150}{14 + 0.552\frac{12 \times 12}{2.5 \times 2.5}} = \frac{375}{26.718} = 14$ tons, which would allow 1-3 or 1-4 for openings."

Berg states that these formulas give results that are apt to be in excess of the necessary strength, but that he prefers to have the fault on the safe side.

In actual practice purifying house walls would be built with pilasters instead of being of uniform thickness, as taken in the above method of arriving at the thickness. In this case the thickness of walls will depend upon the conditions of load. If the weight of boxes and floor is carried upon columns, then a 12-inch wall with pilasters, which is the thinnest wall that should be built, is heavy enough. In the usual purifying house construction the ends of the I beams supporting the boxes are built in the wall, and a stone bearing block, not less than 18 in. long and 10 in. wide, built in the wall for the beam to rest on. Knowing the load on this beam, the wall should be so proportioned that it does not have to sustain a load of more than 6 tons per square foot. Above the tops of the boxes the walls should never exceed 12 in. in thickness, unless the city building regulations require a thicker wall. The pilasters must be properly designed to carry the weight of the roof, and resist the overturning tendency of the wind.

Editorial Note—This completes the reprint of the Catechism which was started in the first issue of January, 1924. A complete index will follow.

AIR REQUIRED FOR COMBUSTION OF GAS

(Continued from page 46)

key. The measuring burette is shown at A and this is provided with a measuring scale which runs from one to twenty and from sixty to 102 cubic centimeters (the divisions are in tenths of a cubic centimeter from 0 to twenty cubic mentimeters, and in fifths of a cubic centimeter from sixty to 102 cubic centimeters). B is a simple Lomsachakow flask. C is another flask of the same kind which is provided with a stop-cock, and D is a phosphorus pipette which is made from brown glass. F and F_1 are combustion pipettes which are provided with a mercury seal and platinum spirals. F is a resistance coil which is inserted between G and F. G is a four-volt battery and H is the leveling bulb.

Underlying Principle of Investigation

The fundamental principle that the investigation was based on was that it must be possible to burn a mixture of gas and air of exactly known proportions in a suitable apparatus in such a manner that the quantity of the gases of combustions that is obtained in this manner, the oxygen content in these gases and the volume of unconsumed air can be accurately measured. The burning process could be accomplished for this purpose only with the aid of an explosion or by means of a platinum wire heated to incandescence caused by passing an electric current through it. For the apparatus must be readily transportable and should be usable under any sort of conditions. Experiments showed that the explosion process, which has gone far to simplify the ease of handling apparatus of this character, could not be used, as at the high temperatures that result during the explosion a part of the nitrogen was made to combine with oxygen, a phenomenon to which Bunsen has called attention in the past. On the other hand, when the combustion was accomplished with the aid of an incandescent platinum wire, rendered so by the passage of an electric current, then the objectionable combustion of the nitrogen in the gaseous fuel did not take place.

Further Description of the Apparatus and the Method of Analysis

In order to determine the amount of air that is required theoretically to effect complete combustion of the gas and at the same time the maximum percentage of carbon dioxide that is present in the gases of combustion under these conditions, a definite volume of gas is drawn into the burette A, shown in figure 1. In the case of coal gas and other similar gases this volume varies from twelve to fourteen cubic centimeters. Then through the cock enough air is drawn into the burette so that the total volume of the gas and air amounts to 100 cubic centimeters. The mixture of gas and air is then caused to bow into the combustion tube E, and there it is completely burned with the aid of the electrically heated platinum wire. In order to accomplish this the gas mixture must be made to flow back and forth several times in the tube. After the gas has been burned the total amount of carbon dioxide in the gases of combustion, which includes both the carbon dioxide originally present in the gas and that produced in the burning process is absorbed in the bulb B and the excess oxygen is removed in the bulb D by means of the phosphorus that is contained in it.

The measured volumes of air, gas, total carbon dioxide and excess oxygen, as well as the volume of contraction before and after combustion, are given in the columns of tabulation 1. These figures are found in the first five columns and the rest of the figures are determined from these five by calculation.

Tabulation No. 1

1	2	3	4	5
Cubic centimeters of gas used	air	Volume after contraction	Combustion CO_2	residual 0
11.0	88.5	16.7	5.2	7.1

6	7	8	9
Residual air	Sum of figures in	(1 2)—7	0.79 × air squals
4.77 × O_2	3, 4 and 5	T'tl nitrogen	N_2 in air
33.9	29.0	70.5	69.9

10	11	12	13	14
N_e—N_9 equals N in gas	Air used 2—6	1 volume gas burns with volume of air	1 volume gas gives 1 vol. of CO_2	Volume in % N_2 in gas
0.6	54.6	4.97	0.473	5.45

Discussion of the Figures in the Tabulation

The excess of air, which is shown in column 6, is 4.77 times the value that is contained in column 5, as in 4.771 cubic meters of air there is contained one cubic meter of oxygen. In column 12 the air required for combustion is obtained from the figures given in columns 1 and 11. In column 13 the carbon dioxide, which is obtained from one cubic meter of the gas, is determined from the figures in columns 1 and 4. In column 14 the nitrogen content in the gas is obtained from the values that are shown in columns 1 and 10. The water vapor that is formed during the combustion of the gas condenses. The maximum content of carbon dioxide in the flue gases, when the combustion is carried out with the theoretical amount of air required for complete combustion of the gas, is found in the following manner from the figures that are contained in the above tabulation.

Maximum Carbon Dioxide Content

For one volume of the gas there are required 4.97 volumes of air to effect complete combustion. In this quantity of air there are 0.79 × 4.79 volumes of nitrogen. One volume of the gas gives on combustion 0.473 volume of carbon dioxide. The gas contains 5.45 volume per cent of nitrogen, consequently one volume of the gas contains 0.0545 volume of nitrogen.

Hence the gases of combustion that are obtained

from the combustion of one cubic meter of the gas are made up as follows:

3.925 cubic meters of nitrogen which come from the air used in combustion of the gas.

0.473 cubic meters of carbon dioxide which is obtained from the combustion of the gas.

0.054 cubic meters of nitrogen which is contained in the gas that is being burned.

This makes a total of 4.452 cubic meters in which there are contained 0.473 cubic meter, which corresponds to 10.63 per cent by volume of carbon dioxide gas.

Calculation of the Water Vapor Content

In order to be able to calculate the loss of heat in the flue gases, which will be carried out later, it is necessary to determine the quantity of water vapor that is evolved during the process of burning the gas. This can be accomplished by mathematical methods in the simplest manner, as follows: The calculation itself is based on the fact that one volume of oxygen will form one volume of carbon dioxide and one volume of oxygen will also form two volumes of water vapor. It also depends on the fact that the water vapor can be calculated from the difference between the oxygen that is contained in the gas and that contained in the volume of air that is required for theoretically perfect combustion and also from the volume of oxygen that is required for the formation of the carbon dioxide gas that is evolved during the combustion process.

It is therefore necessary to analyze a separate sample of the gas so as to determine the per cent by volume of carbon dioxide and oxygen gas that are present in it. In the example which is being considered in this article the percentages of these two gases in the fuel gas were 1.0 per cent by volume and 2.0 per cent by volume of carbon dioxide. Then the percentage of water vapor developed in the burning process may be calculated as follows:

The Actual Calculation

The air that is required for complete combustion of the gas is 4.97 cubic meters per cubic meter of gas. Inclusive of the carbon dioxide that is present in the gas itself, 2 per cent by volume or 0.02 cubic meter, there is obtained a total of 0.473 cubic meter of carbon dioxide. The amount of carbon dioxide gas that was developed during the combustion of the gas was as follows: 0.473 — 0.02, or 0.453 cubic meter, and in the formation of this amount of gas there was consumed an equivalent amount of oxygen in the air. In the 4.97 cubic meters of air that were employed to secure perfect theoretical combustion of one cubic meter of the fuel gas there is contained 21 per cent of oxygen, and hence the total volume of the oxygen in the air is 0.21×4.97, or 1.043 cubic meters. There is present in the gas itself 1 per cent of oxygen by volume, which means 0.01 cubic meter. Therefore, the total amount of oxygen that was consumed in the combustion of one cubic meter of the gas is 1.043 + 0.01, or 1.053 cubic meters of oxygen. Of this amount of oxygen, 0.453 cubic meters was consumed in the formation of carbon dioxide, which leaves a difference of 0.6 (1.053 — 0.453) cubic meter which was consumed in the reaction with hydrogen to form water vapor, or the total volume of water vapor produced in the burning of the gas was 2.0×0.6, or 1.2 cubic meters.

Correction for Sulphur Dioxide

The hot flue gases are, moreover, composed of 4.452 cubic meters of carbon dioxide and nitrogen and 1.2 cubic meters of aqueous water vapor. It must, however, be mentioned that under certain conditions the amount of sulphur dioxide developed in the burning process must be taken into consideration. But this is only necessary when the gaseous fuel contains more than six grams of sulphur in one cubic meter. When the original gas contains this much sulphur, then there will be developed in the gases of combustion approximately 0.1 per cent by volume of sulphur dioxide. But so small an amount of sulphur dioxide can be neglected without materially affecting the accuracy of the results Whatever error does ensue is of no account in the final result. But when the percentage of sulphur in the gaseous fuel is greater than this amount, then a calculation must be made to take it into consideration, and this is done on the basis of one volume of oxygen required to effect the formation of one volume of sulphur dioxide.

Development of Formulae

It is possible to develop a formulae for the calculation which has just been made if the following symbols are used in place of the numerical values:

1. The air that is required for the combustion of the gas (in which air there are contained 0.21 part of oxygen as the per cent of oxygen in air by volume is 21 per cent) is designated by the symbol a.
2. The free oxygen that is contained in the gas itself is denoted by b.
3. The nitrogen that is contained in the air and in the gas is shown as d.
4. The carbon dioxide gas present after combustion is indicated as e.
5. The carbon dioxide gas that is found in the gas before combustion is f.

All these symbols relate to the proportion of the particular ingredient measured in cubic meters per cubic meter of the original gas.

Then, when theoretically complete combustion takes place, the composition of the gases of combustion is as follows: (e + d) cubic meters ($CO_2 + N_2$) + 2)0.21a + b — e + f) cubic meters of water vapor. When the figures are given in volume per cent, inasmuch as the water vapor disappears on condensation, the composition of the gases of combustion has the final form as shown in formula 1, viz.:

$$\frac{100.e}{e+d} \text{ Vol. \% } CO_2 + 100 - \frac{100-e}{e+d} \left(\text{or } \frac{100.d}{e+d}\right) \text{ Vol. \% } N_2.$$

Conditions in Practice

Under practical conditions there is always a more or less great excess of air present. It therefore seems to be useful to determine whether, in addition to the formula which has been employed for determining this excess of air, namely, the air mixture v is equal to maximum carbon dioxide divided by the carbon dioxide in the gases of combustion, or $v = \frac{21}{21 - O_2}$, it is not possible to develop another formula which can be employed in combustion of gases when little or no carbon dioxide is generated. This is the case when pure hydrogen is being burned.

The problem is now concerned with the determination of the volumetric composition of a flue gas which is produced when an excess of air is used in the combustion. A certain part of the gaseous mixture is mixed with such an amount of air that the sum of the two gives one hundred parts in all. The oxygen content in this new flue gas, obtained in actual combustion under practical conditions, can now be determined. It was found to be g volume per cent of oxygen. This g volume per cent of oxygen carries along with it 3.76 g volume per cent of nitrogen, and the new flue gas then has the composition $\times (CO_2 + N_2) + gO_2 + 3.76\,N_2 = 100$. From this equation it follows that $\times$ parts of carbon dioxide and nitrogen is equal to 100 — g parts of oxygen minus 3.76 g parts of nitrogen, or is equal to 100 minus 4.76 g parts of air.

However, the $\times$ parts of carbon dioxide and nitrogen, as far as they result from the combustion of the original gas with air, must be in the same ratio to each other, that they exist in the theoretical flue gas. The ratios of carbon dioxide to nitrogen in the theoretical flue gas was $\frac{100.e}{e+d} : \frac{100.d}{e+d}$. The residual amount (100 — 4.76 g) is also in the same ratio as follows:

$$\frac{100.e}{100} : \frac{100.d}{e+d} = \frac{100.e}{e+d} \cdot \frac{e+d}{100.e} = \frac{e}{d}$$

Hence the composition of the practically obtained flue gas is as follows:

$$\frac{e(100 - 4.76g)}{e+d}\,CO_2 + \frac{d(100 - 4.76g}{e+d}\,N_2 + (100 - 4.76g)\text{ air (Formula 2).}$$

Another formula may be developed which connects the quantities of air used in the combustion of the gas practically and theoretically and the percentages of carbon dioxide and nitrogen which are evolved. This is as follows:

$$\frac{\text{Practical quantity of air}}{\text{Theoretical quantity of air}} = \frac{\%\ (CO_2 + N_2)\text{ theoretical combustion.}}{\%\ (CO_2 + N_2)\text{ practical combustion.}}$$

Example of Use of Formulae

If the following numerical values are assumed for the symbols in the three above formulae, thus, for a 4.97, for e 0.437 and for d 3.979, then the calculation proceeds as follows:

$$\frac{100.e}{e+d} = \frac{100 \times 0.473}{0.473 + 3.979} = \frac{47.3}{4.452} = 10.62\text{ Vol. \% } CO_2.$$

First in accordance with formula number 1 the volumetrical composition of the theoretically obtained flue gas is as follows:

$$\frac{100.d}{e+d} = 100 - \frac{100.e}{e+d} = 100 - 10.62 = 89.38\text{ Vol. \% } N_2.$$

Then in accordance with formula number 2 the composition of the flue gas that is actually obtained in practice and in which an oxygen content of 8.63 per cent has been found is as follows:

$$\frac{0.473 \times 58.9}{4.452} = 6.26\text{ Vol. \% } CO_2;\ \frac{3.979 \times 58.9}{4.452} = 522.65\text{ Vol. \% } N_2.$$

The quantity of air that corresponds to the oxygen content of 8.63 per cent is 4.76 × 8.63, or 41.1 per cent of air. Thus, for apportionment between carbon dioxide and nitrogen there remains 100 — 41.1, or 58.9 per cent. Therefore, the percentage of carbon dioxide in the flue gas is $\frac{0.473 \times 58.9}{4.452}$, or 6.26 per cent, and for nitrogen the percentage is $\frac{3.979 \times 58.9}{4.452}$, or 52.65 per cent.

Further Calculations

Hence the flue gas that is obtained in actual burning of the gas contains by volume 6.26 per cent of carbon dioxide, 52.65 per cent of nitrogen, which is obtained from the gas and the air used to burn it, and 41.09 per cent of air in wihch there is contained 8.63 per cent of oxygen by volume.

Then the amount of air that is required to carry out the combustion of one meter of the gas under practical conditions is found from formula number 3. This quantity of air is denoted by the symbol v and the equation takes the following form:

$$\frac{v}{a} = \frac{100}{6.26\,CO_2 + 52.65N} = \frac{100}{58.91}$$

$$v = \frac{a.100}{58.91} = \frac{497}{58.19} = 8.43\text{ cubic meters of air per cubic meter of gas.}$$

Hence the excess consumption of air is 8.43 minus 4.977, or 3.46 cubic meters, or the ratio between the practical and theoretical air consumption is 8.43 :4.95 or 1.695.

The calculations which have been carried out above

have been tested for their accuracy and have been found to be satisfactory in every way.

Calculation of the Loss of Heat

After the quantity of flue gas per cubic meter of gas burned and the composition of the same are known, the heat that is lost can be calculated from the formula. Heat loss is equal to $R_v.C\ (T - t)$. There are two ways that can be followed in the calculation. In the first way the weight of the flue gases per cubic meter of the gas burned is necessary and in the other case the quantity of gas is expressed in cubic meters. The first method is more troublesome as the gravimetric figures must be calculated from the volumetric analyses. The second method is therefore recommended. It is understandable that the quantity of water vapor that has been evolved during the combustion process and condensed thereafter must be taken into consideration in the flue gas.

The total amount of flue gas which is obtained in the combustion of one cubic meter of the fuel gas with excess of air may be expressed by the formula: R_v = e cubic meters of CO_2 + d cubic meters of N_2 (theoretical flue gas) = 2 (0.21 a + b — e + f) cubic meters aqueous water vapor (water vapor obtained from combustion). (v — 1)a air (air excess).

The heat losses are then, when the average specific heats C(p) for temperatures between 200 and 300 degrees C are inserted in the formula:

Loss in heat = $[(0.426e + 0.316d + 0.357 \times 2 (0.221\ a + b - e + f) + 0.316\ (v - 1)] \times (T - t)$.

Simplified Approximate Formulae

The formula which has been developed for the heat loss in the flue gases is one which is rather difficult to understand. However, when coke oven gas is being considered, it is possible to develop a simpler and approximate formula which gives good results, which are satisfactory for most technical purposes.

It is known that the normal coke oven gas has an air required which varies only within small limits around five cubic meters, and that the maximum carbon dioxide content of the flue gas is between 10 and 11 per cent by volume. The specific heat C(p) can be calculated for the flue gas from the specific heats of the gases in the mixture and this is found to be 0.329, or approximately one-third between the temperatures 200 and 300 degrees C. Then if it is taken into consideration that the air used in combustion always contains more or less water vapor and that the hot gases are also always saturated with moisture, and that as far as the final result is concerned it is immaterial whether the moisture of the air is added or whether their influence is considered separately, it follows that the value of C(p) must not only be higher than 0.316 (which is the figure for dry air), but must be fixed at the proper point so as to counterbalance the too low percentage of water vapor which is found by calculation in the flue gases. Hence it is quite all right to use a value of one-third for the specific heat of the flue gases at constant pressure, and then there is derived the simplified formula for heat loss as follows:

Heat loss = (1-3 R_v practical + ⅜ quantity of water, theoretical) (T — t).

TRAINING INDUSTRIAL GAS ENGINEERS

(Continued from page 43)

These questions are just samples of a host of others which we could ask ourselves and in most cases have to admit an unsatisfactory reply.

Attributes of Successful Industrial Gas Men

When we stop to analyze the qualities that make up a successful industrial gas engineer we find that the attributes which he should possess are indeed varied and numerous. Compare, for example, the scope of the field of the industrial gas engineer with that of other sales engineers. We cannot but reach the conclusion that to sell our high-class product in competition with cheaper fuels we need high-class men. The industrial gas engineer must bring into play scientific sales methods, analyze his market and competition and study the best modes of procedure. All of this presupposes a training in the fundamentals of selling. We must give more attention to the strictly selling phase of our work in the training of our men.

Due to the fact that it is very difficult to obtain men already trained for this work, it is usually necessary to select raw material and properly train the men selected, so that it is of first importance to select the class of men who have the potential capacity for being good industrial gas engineers.

The gas industry today is confronted with many problems, but in view of the great possibilities of the industrial load the problem of selecting, training and educating industrial gas engineers is one of great importance to the industry. If we are to take full advantage of the possibilities of this field we must solve it.

A Window Display on Housefurnishings With the Gas Range in Prominent Position

THE VALUE OF HOME SERVICE

(Continued from page 45)

livered and consumed and available in a convenient form.

Gas is the logical heat and the gas industry has the most to gain by everything that has to do with the improvement of these conditions.

Also the gas industry is the only commercial factor which is in a position to render to the public an absolutely disinterested and unbiased service in testing, developing and recommending gas appliances and in teaching and encouraging the public to make use of them.

This is why the local gas company is the surest and safest and best guide to the purchasers of cooking, water heating and laundry equipment in its community.

And this is why the gas industry as a whole and the gas company in each town has a right to capitalize on the work that is being done by magazines, newspapers, schools and women's clubs in Home Economic work, and to dominate and direct it, the gas company has no choice in this matter. It is a public servant and is compelled to serve. Gas is of no value without the knowledge of its intelligent use.

Two Objects of Home Service

A Home Service Department has two objects—to create more business and to satisfy customers.

In other words, to sell two feet of gas where one was being used before and to leave that customer not only satisfied, but pleased.

Right here let me say a word about proper appliances and correct installation of same.

This is a phase of the work of the gas industry that the Home Service Departments must interest themselves in, because appliance poorly selected with respect to size, design, capacity, etc., will be a source of considerable dissatisfaction to the customer and an uneconomical use of gas results.

On the other hand, a perfectly good appliance improperly installed will be a failure.

Again, if the appliance is properly selected and properly installed, but improperly regulated or otherwise neglected, the gas industry suffers.

The next step is training to use the appliance in preparing foods and to economically and properly cook them. This all constitutes "Home Service."

How Can Such Control Be Exercised?

Some of you will say—"how can the Home Service Department control all these conditions?" It cannot, but it can help materially.

First, to my mind, one of the important duties of the Home Service Department is its contact with the sales force of the organization. Educating by repeatedly bringing before the men and women who sell gas appliances the reasons why an appliance is in stock, what it does and how it does it, so that when a customer comes in for advice that sales person by intelligently questioning the customer can sell her the proper appliance.

Not, as was brought to my attention only last week, sell a bungalow type range to a woman with nine in the family, five members being men, in a home where heavy meals were prepared daily.

A six-burner, double oven cabinet type range should have been sold, or else a standard type cabinet range with oven heat regulator where oven meal cooking could have been done.

This was a hard case for an instructor from the Home Service Department to straighten out. (But the customer, after tactful instruction and encouragement, was pleased).

Proper Installation

Next we have proper installation. This calls for knowledge on the part of the Home Service instructor of burner adjustment.

Next is the demonstration—and we have two the one in the home and the office demon-kinds, stration.

If the proper appliance has been sold and correctly installed, the work of demonstrating is considerably lessened, and results are most gratifying, because customer is satisfied and everybody is happy.

A Home Service Department makes money for your company in two ways, by promoting a more intelligent use of gas and by popularizing new gas usage.

Intelligence in the use of gas increases gas consumption because it encourages use. For instance, if a woman uses a gas range intelligently she will be tempted to use it more freely, and this means increased send out.

If she does not use her gas range intelligently she becomes discouraged and buys more ready cooked foods, patronizes the delicatessen store, dines out as often as she can, or her husband will let her. This decreases the output.

Home Service Makes Money for Gas Company

This means that a Home Service Department is a money-making department in every sense of the word. It means an immediate, permanent and big increase in revenue every time it is put into effect. BUT—here is a curious thing about Home Service Departments.

The less you think about the money-making purpose of Home Service, the more money it will make for you.

The more you think of the public functions of Home Service, the more you think of the co-operative value of the work of the Home Service Department in relation to other departments, particularly to your sales department, the more effective does your Home Service Department become as a money maker.

Therefore, a wise management forgets all about the money-making purpose of Home Service and thinks of its public service and intra-departmental value. The cost of a Home Service Department is recovered by increased production of gas.

Service to Public

How does the Home Service Department render service to the public:

First. By testing appliances to their fitness and efficiency for local and individual conditions.

Second. By making experiments with all labor-saving equipment.

Third. By compiling information, not only that pertaining to kitchen activities, but all branches of domestic science as well, such as data on gas ranges, water heaters, laundry equipment, cookery information.

Fourth. By supplying information and advice on home management problems, cooking, canning, menu planning, diets, marketing, budgeting, etc., by letters, booklets, personal interviews and lecture demonstrations.

Next it renders service to other departments, especially the sales department, by:

1. Helping to serve.
2. Helping to sell.

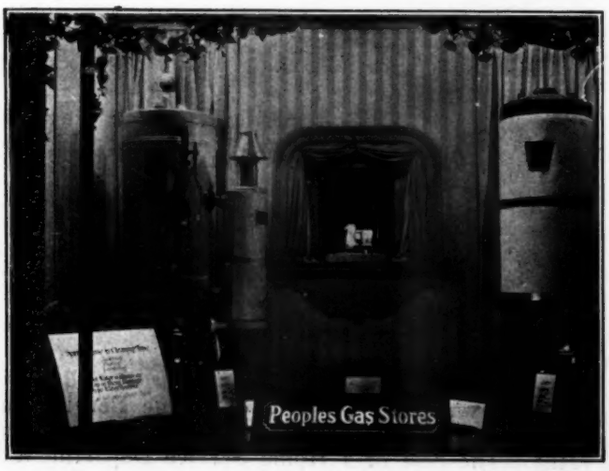
But back to the beginning of this story. Home Serviceis the greatest service any company can render to its community—service for your home—my home—just anybody's home—the home where people are just folks and using every available means to create and promote the health and happiness of their loved ones.

There is no business to be had in a sick community.

Home Service Work keeps your customers healthy, your product in operation and makes friends for your company.

(Continued from page 54)

cleaner, with a gas range beside her. Twe types of heater and tank attachment were shown, each with card stating the price for cash, and on time payments. Small cards placed in a semi-circle on the floor set forth the various advantages of hot water, for laundry, shaving, dish washing, cleaning and bathing. In order to bring the attention of patrons to the comparatively low cost of heating water by gas, they prepared a little leaflet which they mailed with the monthly bill. This advised that the average amount of hot water used each day by one person cost about three cents. Then they showed some of the other items purchased daily which cost the same sum: Three sticks of gum, three Camel cigarettes, one egg, one apple. Money is tossed out for these without any consideration, yet most of them are articles which could be dispensed with with far less inconvenience than hot water. It was a selling argument that forestalled many complaints regarding the cost of operating a gas water heater in the summer.



Fine Window Display Featuring Hot Water Appliances

ADVERTISING CUSTOMER OWNERSHIP

(Continued from page 52)

6,573 consumers in 1912 to 101,184 consumers the first of this year; the value of the tangible property increasing in 12 years from $674,225 to $16,141,902: the large equity of approximately $310 behind each share of stock in this new issue; the supervision by the Railroad Commission of California and the fact that the surplus earnings for the past three years have been more than twice the dividend requirements on all outstanding preferred stock, including the present issue.

Advantages of Investment

The second section cites 10 special advantages the stock possesses, as follows:

Immediate and direct return of 7 per cent per year.

Interest at 6 per cent per year upon all installment payments upon purchase price, giving the investor a 6 per cent return upon his money from the very beginning.

Stock to be listed on the Los Angeles Stock Exchange, thus providing a convenient market for the investor.

Stock free from all State, county and municipal taxes in California except inheritance taxes.

Stock exempt from normal Federal income tax.

Dividends payable directly to the purchasers four times a year, on January 15, April 15, July 15 and October 15.

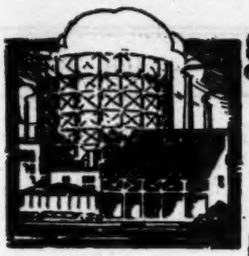
Investment may be made in any amount from one share up to, but not exceeding, 50 shares to any one person.

Payments can be made in 10 equal installments if desired.

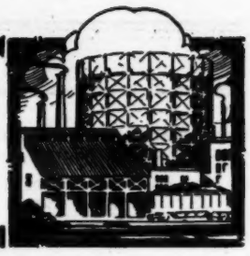
The development of the communities served by the company will be aided by the individual investments in the stock.

The circulars giving information about the stock are being distributed through the offices of the company in the various cities to all the people who call at the offices. Also the circulars are being mailed to all of the company's consumers.

It is interesting to note that the circulars were made as short and to the point as possible and that they are only one page in size, instead of extending over several pages.



NEWS OF THE GAS INDUSTRY



Two Weeks Course Proposed for Industrial Men

Educational Plan of Industrial Gas Section to Start September 21st

The course is to include inspection trips and shop work as well as actual information relative to the fundamentals of gas utilization. All the work will be under the direction of men well qualified for such work.

Mr. J. P. Leinroth, Public Service Electric & Gas Company, Newark, N. J., is chairman of the Committee on Education of Industrial Salesmen, which is handling this work, and all inquiries by those interested should be sent to Mr. Leinroth.

The program is as follows:

MONDAY

10 a. m.—Registration.

11 a.m.—Greeting and Outline.

1:30-3—Industrial Heating Requirements. The different items entering into the final selection of a fuel.

3-4:30—Design of Piping. Use of Cox Computer, Piping Layout.

TUESDAY

9-12—Technology of Furnaces. Advantages and limitations of various types, elements of design, etc.

1:30-4:30 — Demonstrations in shops of operation of furnaces.

WEDNESDAY

9-12—Burner Design and Combustion Systems—Types, advantages, limitations, construction, etc.

1:30-4:30 — Demonstrations in shops—trouble hunting, flue gas analysis.

THURSDAY

All day—Fuels and Furnace Calculations—Theory of Combustion. Heat Losses, effect of excess air and unburned CO. Recuperation, etc.

FRIDAY

9-12 — Temperature Control—Discussion of various types, advantages and limitations of each.

1:30-4:30 — Furnace Auxiliaries, Refractories, Blowers, etc.

SATURDAY

9-12—Gas in Relation to Competitive Fuels, Analysis of Utilization Costs of Competitive Fuels.

MONDAY

9-12—Specific Problems — Low temperature oven applications—baking, japanning, core baking.

Afternoon—Trip to see gas installations.

TUESDAY

9-12—Specific Problems — Heat Treatment of Steel.

Afternoon—Trip to see oil installations.

WEDNESDAY

9-12—Specific Problems—Solution Heating. Gas Fired Steam Boilers.

1:30-4:30—Specific Problems—Non-Ferrous Metals.

THURSDAY

All day—Specific Problems—Other applications not already covered.

FRIDAY

9-12—Plant Surveys. Importance of a Survey and Methods of Making—Preparation of report.

1:30-3—Essentials of Advertising and Local Campaigns.

3-4:30—Talk on Salesmanship.

SATURDAY

9-12—Resume — Problems and questions brought up by student.

Inaugurates Campaign to Reduce Accidents In Gas Industry

National Safety Council Avers Producers Can Save Hundreds of Thousands of Dollars Yearly Through Safe Practices

An aggressive campaign to reduce the number of accidents in the gas industry has just been launched by the National Safety Council, which estimates that manufacturers can save hundreds of thousands of dollars annually through the installation of safe practices that will result in lower workmen's compensation expense, the elimination of thousands of days lost time and the speeding up of production. Appropriate literature on this subject is being mailed to more than 2,000 companies.

Investigations made by engineers connected with the National Safety Council show that for every thousand men employed in the gas industry 68 are injured each year as a result of the hazards attendant on their work. According to W. Dean Keefer, director of the industrial division of the council, more than 90 per cent of these accidents can be prevented.

Gas companies are being invited to submit their safety problems to the engineering experts of the council, who will render free consultation service, regardless as to whether or not the inquirer is a member of any of the 62 affiliated branches or the National Safety Council. The research library of that institution has compiled a wealth of material based on information received direct from gas concerns that have been members for years.

"A very well known gas concern," according to Mr. Keefer, "reduced its accidents costs per $100 payroll from $4.18 to $1.62 in only one year, a reduction of 61.2 per cent and was kind enough to attribute this saving to the information received from the council. Another large concern reduced its costs from $2.59 to $0.58, a reduction of 79.5 per cent.

"It is to be regretted that for every thousand men employed in the gas industry 68 are injured each year. The severity of these accidents can be gauged by the length of time they keep the worker away from his job. This averages ten days per man. For each personal injury accident there are scores involving a time loss or property damage. For the entire gas industry this is enormous. A reduction of only 25 per cent would give an employer two and a half days additional labor per year for every man employed.

"While some of the larger gas companies employ engineering specialists to reduce operating costs through devoting all of their time to safety work we realize

that every concern cannot go to this expense. These firms should designate a foreman or old employee to handle the accident prevention work, which is not as intricate or difficult as some people may imagine, although the efforts should not be handled in a haphazard way.

"Definite knowledge of what should be done and how it should be done is essential in safety work. Numerous gas companies already are availing themselves of the various forms of service offered by the National Safety Council, which is a non-profit making institution supported by more than 4,000 employers scattered throughout the country. We send our members a monthly publication, safe practice pamphlets, illustrated safety posters, leaflets, booklets, lantern slides, moving picture films, etc., which have been used successfully in some of the largest gas plants in the country.

BRIDGETON GAS CO. IN ANNUAL MEETING

Reports Show Use of Gas Increasing and Territory Well Served

Bridgeton, N. J.—At the annual meeting of the stockholders of the Bridgeton Gas Light Company these directors were elected:

Bloomfield H. Minch, Samuel P. Fithian, William C. Mulford, Edward P. Bacon and Joseph H. Powell.

At the directors' annual meeting these officers were chosen:

President, Bloomfield H. Minch.

Vice-president, Samuel P. Fithian.

Secretary and auditor, William C. Mulford.

Superintendent and treasurer, Jacob B. Jones.

Assistant superintendent, Seo DuBois.

Assistant treasurer, Ethel Harwood.

Annual reports presented by the officers showed that the use of gas continues to increase. There are mains on practically every street and the territory is being well served by this public utility.

A. G. A. News Service

The A. G. A. News Service, which is one of the regular activities of the publicity and advertising section of the American Gas Association, and which is mailed weekly, in the form of a bulletin giving news items and stories concerning the gas industry, represents a very valuable piece of work of the association. The semi-yearly service report has just been issued, outlining the progress made in spreading the story of gas, through this service. This contains a number of comments made by directors of various public utility information committees, all of which bring out very strongly the value of the service. There are also given the names of the various journals and publications that are reviewed in gleaning information for compiling the bulletin.

Charles L. Holman Resigns as President of Laclede Gas Co.—George B. Evans Elected New President

St. Louis, Mo.—After 22 years of service with the Laclede Gas Light Company in positions ranging upward from private secretary to the president to the presidency itself, Charles L. Holman has resigned from that company, to become head of the Georgian Manganese Company, a New York corporation formed by the Harriman and Rockefeller interests to operate a manganese concession in Russia. George B. Evans, who has been with the company for 20 years, and who is well known throughout the gas industry, has been elected president to succeed Mr. Holman.

George B. Evans

Mr. Holman entered the service of the Laclede in 1903 and has been its president since 1912. He at one time was president of the National Gas Association and for the last year has been vice-president and member of the advisory council of the American Gas Association, from which positions he is resigning. In his new activity Mr. Holman will have headquarters in New York, but will spend two or three months annually in London, Berlin and Paris on missions for the manganese company, which has obtained an exclusive 20-year concession from the Soviet government to operate the manganese mines in the Tchiatouri district of Georgia about 100 miles from the Black Sea, and export their product.

Mr. Evans, new president of the Laclede, is a graduate of the University of Wisconsin in civil engineering and for several years has been vice-president and general manager of the company, having been its chief engineer prior to that. He long has been active in affairs of the gas associations, especially in their technical councils, where his voice always is listened to with respect.

Gas Company Expands Service

Bessemer, Ala.—The Birmingham Electric Company has completed changing all gas mains on the north side of Bessemer at a cost of $250,000. The increasing popularity of gas for cooking and heating purposes called for larger gas mains, it was stated.

The new mains will furnish gas to more places, with a higher pressure, and the present pipes are large enough to care for a much larger consumption of gas than is now being used. The company is certain of expansion in the use of gas, it was pointed out.

A. G. A. Sales Service Issues July Plans

There has just been issued by the Sales Stimulation Committee of the American Gas Association, under the title "July Plans, A. G. A. Sales Service Plans, Volume 1," a very comprehensive folder dealing with two important problems in the commercial phase of the gas business.

The first of these problems is concerned with the Organization of Architects and Builders' Service Bureau. The plan is divided up into ten parts. These parts take up in order the Arguments in Favor of Organizing the Service Bureau; the Scope and Functions of Bureau; Operating Routine and System of Forms; the Dodge Report and Its Uses; Agent's Report to Bureau; the Bureau Reports to Sales Departments; the Monthly Report Summary; the Monthly Dodge Report Summary; the Monthly Work-in-Hand Report and the Monthly Individual Report Analysis. Sample forms are given.

The second of the plans relates to the Promotion of Service Bureau. It is divided into three sections. The first of these deals with the Inaugural Dinner Publicity Promotion and the second with the Direct Advertising Drive. This drive is on architects, builders and owners. The last section deals with a special follow-up.

The two plans are treated in a great deal of detail and form a very valuable mass of information which all gas companies should take advantage of.

The Logan Gas Co. Will Raise Rates

Findlay, O.—Gas bills in Findlay will show an increase after July, the Logan Natural Gas Company having been granted permission to place new rates in force on that date. The schedule has not been finally approved by the Public Utilities Commission, but the company posted a bond of $400,000 as a guarantee of a refund to customers in the event that the commission holds the rates too high.

British Coke Competition Postponed to July 31

It has been decided to extend the date for the final reception of papers to Friday, July 31; and no latitude will be allowed beyond that day. Several papers have already been received. The competitors, whoever they are (and their names will not be known to the adjudicating committee until after the awards have been made in respect of the whole of the papers submitted) will in no wise suffer by the delay; inasmuch as the work of adjudication will take time. The members of the committee will individually read all the papers before making their concerted awards. Not until after the whole of these have been made will the envelopes be opened which will reveal the names of the successful contributors. Through the individual reading by the three members of the committee the work will occupy more than the month of July—in fact, it is difficult at this stage to say precisely how many weeks will be required to perform the work faithfully and satisfactorily. But no time will be lost, within the limits of the ability of the committee to carry out their voluntary and pleasing, though responsible, task.

L. B. Jones Resumes Consulting Practice

During the past five years L. B. Jones, who returns to consulting practice, directed the affairs of the Oil Gas Process Company as president and engineer. During that time was installed the Improved Jones Apparatus throughout the West and an installation was also made at New Bedford, Mass.

Prior to service in the Engineer Corps during the war, Mr. Jones was for 13 years with the Pacific Gas & Electric Company and as assistant chief engineer had direction of construction and operation of their many gas properties. To the constructive policy of that company is due a large part of the credit for oil gas development.

While Mr. Jones still retains his interest as a director and stockholder in the Oil Gas Process Company, which company will continue to license the use of the Jones patents, his desire for a broader field of action in regard to general engineering has prompted him to resume his consulting practice.

Iroquois Gas Plans Considerable Development Work

Buffalo, N. Y.—The Iroquois Gas Corporation will spend more than 61,000,000 this year on new development work, according to Thos. R. Weymouth, president. Fifty additional miles of pipe will be laid in new sections of Buffalo and vicinity, Mr. Weymouth said. He estimated that the company's new developments would enable it to care for 10,000 new customers.

Predict Big Development of Superpower in Gas

In an analysis of the Public Service Corporation of New Jersey and its underlying operating companies, prepared by Bonbright & Co., Inc., the prediction is made that superpower in gas will play one of the next big roles in American industrial development. A step in this general direction has already been taken by the Public Service Electric & Gas Company, which recently joined together its gas producing and distributing properties of the northern and southern parts of New Jersey.

In this way a complete pool of gas resources throughout the various communities served was brought about by the Public Service Electric & Gas Company, and, as in the case of superpower in electricity, the resources of one plant can be used when needed to augment the resources of another plant.

Byllesby Acquires Wisconsin Utility

Milwaukee, Wis. — Announcement has been made of the completion of the sale of the Wisconsin Public Service Corporation to H. M. Byllesby & Co.

The deal involves $26,000,000, the terms of which require a cash payment of $11,000,000.

The acquired corporation supplies electricity and gas to an extensive territory in Eastern Wisconsin, including the cities of Green Bay, Oshkosh, Manitowoc, Sheybogan and Marinette, and also Menominee, Mich., and approximately 100 other communities.

Insull Interests Buy Central Light

The Insull interests have added another group of utilities to their large Middle West Utilities Company system, the latest acquisition being the Central Power & Light Company, the subsidiaries of which operate in Texas, Oklahoma, Kansas, Mississippi and Mexico. The properties taken over have total assets of around $15,000,000, with annual gross earnings of more than $5,000,000.

An announcement on behalf of the Middle West Utilities Company said that it had purchased from R. W. Morrison and Warner S. McCall of St. Louis all the common stock of the Central Power & Light Company. The company operates directly in Arkansas. Electric light and power, gas, ice, water and electric railway transportation are the utility services supplied in one or more forms to 65 communities. Natchez, Miss., Laredo and Corpus Christi, Texas, and the Rio Grande Valley of Texas are among the districts where electric service is provided. The principal gas companies are located at Emporia, Kan., and MacAlester, Okla. Houston and San Antonio, Texas, are the largest communities supplied with ice.

Iowa Public Service Co. Changes Hands

Ames, Iowa. — Announcement has been made that all the capital stock of the Iowa Public Service Company, operating the Ames gas plant and supplying gas to this city and Nevada, has been sold to the Iowa Railway & Light Company.

It is stated that the company will install a new gas machine and additional purifying equipment in the plant and will complete the work of placing the Nevada distribution system on a high pressure basis.

Gas for Kirkland

Albany, N. Y.—The Public Service Commission recently held a hearing on the application of the Utica Gas & Electric Company for consent to furnish gas in the town of Kirkland, Oneida county, and the village of Clinton, and for approval of franchises granted by the localities. The company expects to serve about 350 customers. The estimated cost of construction is $70,000. There was no opposition.

Contracts Awarded

The St. Louis County Gas Company is preparing to make improvements to its Webster Groves plant. Part of the additional apparatus installed will consist of two Andale Aftercoolers, together with the necessary connections, etc., required for them. In addition to the Andale Aftercoolers there will also be installed a Cottrell Electrical Tar Precipitation Plant having capacity of approximately 6,000,000 cu. ft. of gas per day.

Contract for all of this work has been awarded to the U. G. I. Contracting Company of Philadelphia.

Cincinnati, O.—The Stacey Mfg. Co. has secured the contract for the erection of a 2,000,000 cu. ft. capacity four lift gas holder at the plant of the Illinois Power & Light Corp., Decatur, Ill. Holder will have an internal tank having a storage capacity of 2,000,000 gallons of oil.

The same company has also been awarded the contract for the installation of a 500,000 cu. ft. capacity three lift holder at the plant of the Wisconsin Gas & Electric Co., Appleton, Wis.

The Gas Machinery Co. of Cleveland, Ohio, has been awarded the contract for a new six-foot carburetted water gas apparatus to be erected in the gas plant at Kankakee, Illinois.

This new six-foot set is to be complete with brick operating floor, air and steam meters, pyrometer, explosion check valve and auxiliary equipment.

The Detroit City Gas Co. of Detroit, Mich., is making changes to some of its purifiers and has awarded the contract to the Western Gas Construction Co. for this work.

The City of Richmond has placed an order with the Western Gas Construction Co. for an 11' water gas set equipped with "Western" control and connections to waste heat boilers.

The Byllesby Engineering & Management Corporation of Chicago is making considerable additions to its plant at Louisville, Ky., and has placed an order for a large amount of welded steel piping and valves with the Western Gas Construction Co. for this work.

Niles Gas Light Co., Niles, Mich., is adding to its present holder capacity and has awarded the contract to the Western Gas Construction Co. for an additional 200,000 cu. ft. gas holder for its plant at Niles, Mich.

Option Granted on Brooklyn Union Gas Co.

Brooklyn Borough Gas Company again is being sought by outside interests, according to information emanating from Philadelphia, where control of the company rests with the Foerderer estate.

An offer of $107.50 a share was said to have been made for all the outstanding 40,000 shares of common stock. Holders of the shares have been advised of the offer in a letter sent with the quarterly dividend check.

As was the case in a previous option granted to outside utility people, the name of the new prospective purchaser has not been divulged. Henry L. Doherty & Co. held the previous option to purchase the Foerderer and other holdings, but this option was allowed to expire. Since it expired it has been reported that another public utility group received an option, and this is the one believed to be in negotiation at present.

The letter to stockholders states that a majority of the stockholders have accepted the offer, and holders have until August 8 to deposit their shares with either the Land Title & Trust Company of Philadelphia or the Seaboard National Bank of New York.

At an offered price of $107.50 for the Brooklyn Borough Gas Company stock the deal would involve a total of $4,300,000 for 40,000 shares.

Iroquois Gas Co. Increases Capitalization

Albany, N. Y.—Iroquois Gas Corporation, Buffalo, has filed a certificate in the office of the Secretary of State increasing its capital from $22,500,000 to $25,000,000.

Correction

Among the list of exhibitors at the 1925 A. G. A. Convention, published in the issue of July 11, the address of the Superior Meter Co. was erroneously given as Bronx, New York. This should have been Brooklyn, New York.